

## AFA Policy Forum

**General Gregory S. Martin**

*Commander, Air Force Materiel Command*

*AFA National Symposium*

*Washington, D.C.*

*September 16, 2003*

General Martin: What I thought I'd do today is just take you through my thoughts as I completed an operational assignment and now head into a completely different aspect of what we do in the US Air Force to prepare for the future, while we are sustaining the kinds of systems that have brought us so far in the last 100 years.

What I want to do is first start out with the thought that we can go a long time between major conflicts or major events. For the US Air Force it was from the end of the Vietnam War until Desert Storm. There were a few minor dust-ups, but for the most part a long period of time. Then, since Desert Storm, there have been five conflicts. One of the things that we've tried to do pretty conscientiously is to look back very quickly but thoroughly after those events to capture those events, those significant lessons, those observations that perhaps will guide us and give us the next level of performance that we need in case another event occurs. That is always an "in case," but as you know in the last twelve years, that "in case" has happened more often than any of us would wish.

These are the common threads. I was listening to the Chief very carefully and these are primarily my thoughts, but they are my thoughts from a group of people who have been working together for a long time, reading the same kinds of things and it just goes to show you that a monkey, given a typewriter and enough time, could probably produce whatever it was, the opera or whatever. I can tell you, when you listen to what the Chief said and then you look at these words, I can tell you who the monkey was with that typewriter. It was not the Chief and you may have noticed, he didn't have them written down. We know who the monkey was in this case.

But, take a look at this... We have found no matter where the event occurs there is a need for global access. That global access can come from tankers. It can come from systems that are in space or it can come from the opportunity to work with coalition partners and achieve basing and over flight rights. Very important for us to always keep in mind.

We must work together, particularly when you talk about the global war on terrorism, which is a threat to all free countries. As the chief talked about, you can run out of people that can stand up and operate in sustained operations from bases, so you have to pick them very carefully. You have to make sure you understand your limits and you have to have the materiel and the supplies, the reserves you need to be able to feed, house, take care of medical, get the communications, get the munitions, all of the fuel, everything it takes to operate out of those bases. This expeditionary concept is our roots, but an area that it takes us awhile to get back to our roots after the period of the Cold War.

There is absolutely no question about the force multiplying effect of a Combined Air Operations Center, a group of people who have the information pouring in and are able to sift through it and come up with the right approach for the next events that we will pursue.

We learned more so in Operation Iraqi Freedom than any other conflict about the importance of a fully integrated planning and execution capability. And you must exercise that. You must train to it. You must plan for it. You can't just expect it to happen. It won't happen. Most of us would rather go to our activity centers that we are used to and work on the blocking and tackling, the functional skills that we are comfortable with. It is only when you put them under the stress of a serious exercise or a major contingency that you find out what kinds of connectivity, where the

seams are and how you work together as different cultures. That has become very important to us and I think it was incredibly successful during Operation Iraqi Freedom.

The value of interoperability. Interoperability not only in terms of systems, but in terms of tactics, techniques and procedures and that comes from a group of dedicated forces that work together across national boundaries, across joint boundaries to develop the methods by which they can support one another. We've been the beneficiary of that activity for years in things like Bright Star and NATO air meets, in Ulchi Focus Lenses—all around the world these exercise programs bring together the people who, in time of crisis may need to work together and you can't do it from the get-go. It is something you have to have trained for and have practiced and taken action when things weren't working.

The persistent theater, ISR and strike capability that can deliver discriminative effects near instantaneously and give you the BDA. That is a real mouthful, but in the end we can't be thinking of this sensor or that sensor or that bomb or that platform. You've got to be thinking about what the capability really is and that is an area we are looking for.

Last, it is obvious to us all that when we get into one of these conflicts, it is the people that we are helping that will build that country back and you must care for them from day one.

So, over the last 12 to 13 years, in five serious conflicts for the United States—Desert Storm, Deliberate Force, Allied Force, Iraqi Freedom and Enduring Freedom just prior—these are some key takeaways that we should focus on. And we are. We are making great progress.

Now, where are we going next? When we take a look at the concept of transformation, whether we are talking about the new NATO command that has been stood up for transformation or we are talking about the transformation within our own countries or even in our own business processes, you have to ask yourself, from what to what? From what to what? Then, what you see is that actually it turns out to be those technologies, those infrastructures, those opportunities and organizations that can do what is really the ultimate goal of transformation—to define the battlespace on our own terms.

The unfortunate and sad thing about the global war on terrorism today is that we are not defining the battlespace on our own terms. More often than not, we are reacting. So what we do in the future with those common threads that I just talked about is to get ahead and to try very hard to work on those things that will give us a chance to find that terrorist, to find that organization, to find that node, to find that network before it finds us or before it executes another activity against us. They right now are defining that battlespace and we have to be very careful about what it will take to do that. It can't be done by one nation alone. It can't be done by one service alone. It has got to be done in a joint, in a combined and in a very partnered and collaborative way. This is our challenge, I think, in the free world.

These are my thoughts on it. As an airman, the thing that we try to deal with, day in and day out, is the concept of getting wherever you need to go with a piece of ordinance that can be delivered precisely where you want it to be, whether it be, as the Chief mentioned, food or a weapon. You have to know where that place is that you want it delivered. You have to be able to make a decision and you have to do all of that within time to make a difference. If you take a look at the colors up there, you can see we can go just about anywhere in the world and we can deliver precision ordinance about anywhere we want, but knowing where, making that decision and doing it in time to have an effect, particularly on a fleeting target is the challenge that we face. That target could be the next guy to fly an airliner or drive a boat or drive a truck or drive a train into a populated area. That is the knowledge piece we are talking about, and then having the mechanisms for being able to take action and decisions and then of course being able to do it before that target is gone.

So, what that argues, in my mind, are these three transformational capabilities. We have to have battlespace at the touch of a screen. Today, we have a multitude of sensors, all of which use their

own algorithms, communication systems and produce some sort of a picture about something. Usually they are in compartmentalized areas and they are not integrated. If you are lucky, you can get them all into one room, but then the brain is the guy who has to do the integration and do the analysis and then ask for some assessments. What we really want is we want the system to start that process on their own with self queuing, machine-to-machine interfaces and begin to give you battlespace awareness at the touch of a screen.

And then it has got to be presented in a way that people can make decisions quickly, understand where it came from, understand where it is, who it is and where it is likely to go so that by the time some piece of ordinance gets there, it will hit it in time before it is gone. The presentation of information is not only a science—there is an art to the way we present information in a way that people can understand it without being overwhelmed with digits and data and matrices that take an analog and digital computer together to figure out. We need to be able to present that in a way that a human can look at it and see the picture immediately and take action. And then, last, we have to be able to achieve desired effects near instantaneously.

Those are the three areas in the area of transformation that can make a big difference, I think, when all is said and done. In fact, most recently, last week the senior leadership of the Air Force spent a full day together at the Pentagon in a process that the chief talked about it called the capability review and risk assessment program (CRAW), where we are taking a look at what our required capabilities are and then how well we are able to do portions of that capability, with the systems that we have and the plans that we have for them.

Eventually we will be able to figure out where the marginal players are and where the technology opportunities are. When you take a look at it from that perspective, then all of a sudden you begin to see that these are the areas where we should be beginning to make a difference. What we did in that discussion, which lasted about eight hours, was hardly talk at all about any platform or any weapon system, but we talked a lot about data links, sensors, integration, fusion, the ability to get the information around and make decisions, battle damage assessment so that we could retarget or move forward on to the next flow. Methods of changing battle damage assessment capabilities—all of it had to do with these things, very little had to do with the actual platforms themselves. We've gotten to the point where the most significant enabler we have for the next level of performance required is the connection, inter-connection and machine-to-machine and ultimate display of information for making decisions.

It is at that point that we'll find out whether we are fast enough, once you've made that decision to be able to take action. We can't wait until that has happened. We've got to start thinking about that now.

What I would say is, when we take a look at that battlespace, at the touch of a screen, we are talking about knowledge. Then comes decision, and then action and time. All oriented to breaking the next barrier that is before us. It is to break the time barrier. That is where we are headed, is to break the time barrier.

Our core competency in the US Air Force that the Chief and Secretary have talked about is very important for us to keep in mind. All this time we have been developing airmen who think about air power in a way that is so important and so meaningful. We have been experts since the 1940s of getting technology to warfighting. And then, that technology being integrated and those operational concepts into something that can produce a result that the commander wants.

What I'd like to do now is talk a little bit about the technology to warfighting that is focused primarily along the lines of the three major areas that we just outlined—the knowledge, the decision and the action in time.

First, when you do that, we take a look at this job that I've got in Air Force Materiel Command, partnered with the Assistant Secretary of the Air Force for acquisition; this really is focused at a cradle-to-grave mentality for the development of systems, the systems that are asked of us by our

warfighters. That has really started by world-class science and technology. That concept, that technology to warfighting is very important, but we have in our Air Force Research Lab and we have in many of our government agencies, world-class people doing great work for us, whether it is in directed energy, in information management systems or in some of our explosives capabilities.

That then needs to be integrated into the development of world-class weapon systems which then must be fielded and fielding is a different process than developing. And then we must sustain them and modernize them because, as you know, these aircraft are lasting a lot longer. We've got the B-52 just recently with its Lightning Two Pod being used in Operation Iraqi Freedom very successfully, integrated in a very short period of time by one of our logistics centers. And then we do depot maintenance. We make sure that we are tearing those aircraft apart entirely and that they can last and that they can be safe and that they can be upgraded without doing damage to their air worthiness. Those are the kinds of things that we look at when we do cradle to grave.

Let's take a look now at the science and technology piece. It started with Lieutenant General George Muellner and Major General Dick Paul about six or seven years ago. We took the different technology capabilities that we had in the different labs and we merged them together into a single US Air Force lab and they have, as you'll see in a second, ten technology directorates, one that deals with sensors and more and more we are finding that you have to have enterprise thinking because sensors can't be just the lens capability. There is an aperture, there is an antenna, and there is a materials aspect to it. But, in the end, the development of sensors, making sure that whatever we develop can be used by human beings that we are asking to use these systems. And that is something that they can do; it is within their capability.

Of course, as we mentioned, if you are really after the knowledge and being able to make the decision, you really have to think very hard about how you are using not only the ability to transmit electrons, but the ability to sweep them up and present them in a way that is useful and meaningful.

We are pursuing, as you know, many forms of directed energy, lasers and HPMs and those sorts of things all for the idea of determining how we might be able to take actions necessary, sometimes in a non-lethal way.

We can't ever forget that we should be pushing the edge of the boundary when it comes to time and speed and the propulsion systems are very important for us to pursue, again, one of our technology directorates.

As you know, we've been very successful with munitions, but now comes the smaller ones, the more high explosives, those types that might be able to take out things in tunnels that you couldn't get to necessarily with the weapon itself, without some sort of sophisticated munitions.

Space vehicles is an area that we work very hard on as we begin to migrate more and more of our capability and potential into space, and the materials that go with that.

Air vehicles, we can't forget those, between air and space, our core capabilities and, as you know when you take a look at some of the latest aerodynamic capabilities, some of the observabilities, as well as some of the more efficient airframes, those are areas we should continue to explore, particularly as we talk about that concept of global access where you may need that kind of efficiency to reach the areas of interest.

Materials are something you use across the entire spectrum of our research and development activities. These are all underpinned by basic research, most of which we do outside of the Air Force Research Labs but within the overall responsibility of the lab as we gather up our industry experts, our university experts to look at new and better ways of doing things.

Now, you take those three areas that we just talked about: the idea of knowledge, decision and action in time, and then take a look at how we map those technologies together and you'll find that there really is a very important synergy that we have within our Air Force Research Lab to the warfighting needs. It is at this point that we begin to have our applied technology councils begin to feed into our summit process and ultimately into the capability review and risk assessment program. When you finish that loop, and you've got it working right, you've got a system that is focused on being able to answer some of the most vexing problems that we deal with as we think about where we should go in transformation. That is the way we're arranged in the Air Force lab business. That is what we are paying attention to as we look at transformation.

Then, when you take it back, you see that whole basic research really under girds the entire process. You can never move so far forward into the development process that you forget about the next technology that might make a difference.

As I think you can see, when it comes to cradle-to-grave and the emphasis I just gave you on science and technology, the Air Force Research Lab actually touches all parts of it. There are S&T activities with respect to depot maintenance that we should be paying attention to. But in the end the high payoff items that we are looking for are up there in science and technology, to developing weapon systems that are world-class and meet the capability shortfalls that we find through our process of review. That is what I look at when I think about the cradle-to-grave and I think about where we are going to get to the next level in the US Air Force.

Along those lines, a key effort, hyper-spectral, multi-spectral, able to sense things in a way that we have never been able to sense them before, and because we have the computational capability to do something with it, it can begin to give us insights that before were just questions we had. And now when you begin to integrate that and cross two sensors you begin to understand the characteristics of the system in a way that we've never been able to understand them in time before. In order to populate the world with the kinds of things that we need to, the idea of nanotechnology, microelectronic mechanical systems, reducing the weight and volume of everything we are doing allows you to build things in a cheaper way, a more efficient way and certainly in a way that they can be proliferated and give you better and more information than you had before so that you can have that battlespace knowledge at the touch of a screen.

It is kind of funny that with all the work we've put into technology, that we have animals in the world that have sensory capabilities that are in most cases superior to anything we have been able to mimic in the technology world. Many of you know about the pit vipers and the very capable IR systems. I just can't put that snake head on the front of a missile but it sure would be nice to be able to mimic that on a very miniaturized capability. When it comes to explosives, many of you have heard me say this before—the most sophisticated sensor we have is a dog. The stand off distance is a leash. We have got to do better. Or you are going to lose the handler or the dog with the guy that's got the explosives. We need to find that explosives out there at a tactically significant range and then we need to be able to disenable it. Then we can go take a look at it.

Biometrics gives us an opportunity to take a look at those parts of our universe that have actually reached those sensory capabilities and the phenomenon that allows that to happen and to see if it can't be mimicked into some mechanical systems.

Propulsion, as I mentioned; I find it interesting that we flew the X-15 at Mach 6.7 back in the mid-1960s and yet, at that time, did not really have a need for that capability because our decision process, our knowledge process did not require that kind of capability and speed, given other priorities. We are getting to a point where now we have to look at, what are the methods of propulsion? Can we get single stage to orbit? Do we need hyper velocity systems or not? But we can't sit on our laurels. That is an area that we've got to continue to press because when we need to get somewhere in time, we want to have worked the process to make that happen.

Directed energy, speed of light, it may be that is the great equalizer for everything, we don't know. We'll see in a short period of time as the airborne laser begins to develop and go forth for a

shoot-down. Those are just examples of some of the sophisticated technologies working to get back at that problem that looked at the ability to have knowledge, decision and action in time.

And for us at the Air Force Materiel Command, we are a supporting command. We take our orders from the Air Force and the Air Force Research Lab from the command, we get our guidance on where we should put our efforts because in the end, all of that effort, just as Secretary Roche and then General Jumper have said, is technology to warfighting and those are the warfighters that we support, day in and day out. All oriented towards the precision and the range and the knowledge, the decision and the action for beating the time barrier.

As I said, it is a great pleasure for me to be here today and just share a little bit of the activity that I have just jumped into. You can tell I am not excited. You can tell I am not interested in what I am doing. But I will tell you that as I have left the field and a great, great opportunity in Europe for nearly three and a half years and came to this amazing opportunity at the Air Force Materiel Command, and was very quickly surrounded by some of the most significant brains in the country who care deeply about America, I am thrilled and excited to have an opportunity to be on a different train going the same way, looking at different things that eventually will pay off for the warfighter. This opportunity to work with what I consider to be some of the world's finest technical and military professionals is something that I relish and look forward to and stand before you today a guy with a mission, a guy with a smile and a guy with some energy that is going to have a great time at Wright Patterson Air Force Base. They've got a mission. They know what the warfighter needs and we've got the people behind it that are going to make it happen.

Q: What do you see as the future of hypersonic technology? Is it emerging in the first half of this century?

General Martin: As I mentioned, we have an important interest and airmen have always had an important interest in speed. It is an activity that I think it is important for us to pursue, but I think we have to pursue it at the right pace, for two reasons. One, studies have shown that if you were able to get it, right now you don't have the processes that will use it as effectively as perhaps other capabilities. Second, it is very expensive. In terms of the infrastructure it takes to sustain that operation to the high, high hypersonic levels and in terms of its military value, we have to run the balance very carefully. A lot of people have been working this problem for quite some time. To the basic question, we are very close to a demonstration capability within the next five years. As you know, NASA was working on that and we had an unfortunate loss of the launch vehicle that was going to get it up to its initial speeds. We are close in terms of having done what I would consider to be the right emerging and some of the initial testing, but in terms of materiel, in terms of getting the right full integration combination, I think we are on the right track at the amount of money we are putting at it to be able to demonstrate the hyper-velocity systems within the next five years or so. But then what you do with it and what it costs to sustain that are the kinds of questions that we have to understand as we continue that effort. We can get there, but I think it is going to be a little longer before we will have a system of military utility, if in fact, it is required as we continue at the same time with this directed energy business. We have to look at that balance.

Q: Are we leveraging our lessons learned in industry to improve the speed and efficiency of our supply system?

General Martin: Downstairs today, in the exhibit area, they were announcing the Excellence Awards. There is a great initiative there called COLT that put together, some people would say, a pretty simple software effort. Any software effort to me is very complicated. But they put together an update that continually updates and monitors the status of our spares, the utilization rates and the automatic ordering process. Those are activities that we have gotten from industry. We have worked hard over the years on things like divesting ourselves of things that heretofore we thought we had to have, such as Log Air or dedicated military air before and gone into things like UPS and FedEx.

I will be honest with you, it is more extraordinary than it is natural. We have to look very hard as we work through the day-to-day issues to free up a group of people that are experts in functional areas to ask them to go out and look at industry so that we can harvest some of those good and successful ideas at a faster rate than we have. In general, I think we've been too slow in taking advantage of some of those opportunities. By the same token, that team has to make the assessment on whether that company and that initiative is actually going to be a sustained effort, or if it is a flash in the pan. There is a risk associated with that, but in general we have done some good work at it, just not enough. We need to more. The Secretary sensed that and that is why he established the BIC for trying to harvest those initiatives and move forward quicker.

Q: How do you see the growing problem of aging aircraft having effects on our ability to achieve transformation?

General Martin: We really have to look at two things. It costs an awful lot of money to design a new aircraft and to test it and to field it that gives us a huge capability increase by virtue of the fact that we build a new airplane. I am thinking primarily about aerodynamic propulsion and range capabilities that the platform gives you versus the sustainment of a system that can be modified and have effective life left in it. The balance, though, will sway to modernization or updating of an old platform versus a new platform construction based on our best assessments of how long the airframe will last and how much it will cost us to maintain it, or to modernize it and maintain it. We are not as far along as we would like to be in making those assessments on some of our older aircraft and hence we've started the Air Force sleep liability board where we are going into a full-blown analysis capability.

The first aircraft we will do will be the C-5 to determine what the likely areas of risk are and then what the cost will be to either to continue to operate it or to change those areas of risk out. We have an aging airframe, our aircraft program office that is now beginning to put together the kinds of tools that tell us about that. We never operated aircraft at the pace that we need to operate them at this age before. I don't have the answer on whether we can sustain it. I have the direction on how we will find out what it will take to sustain it and then at that point we'll need to make the proper decision. As General Jumper talked about a few months ago on the C-5, we are not sure exactly what it will take—our re-engining and modernization effort, the re-engining and reliability program that we have designed for that program. We are not sure whether the A model or the B model will actually accept that modification and produce the kinds of availability results that we need. We are going to study that. We are going to do that both in the process of the test that we will run with that program and at the same time with the aging airframe and the airframe viability board that we are setting up. We don't have the answer, but we understand the potential problems and are now beginning to harness some resources that way to give us some insights.

Q: Discuss the new Program Executive Officer restructure and what you hope to achieve from that organization.

General Martin: As many of you may have heard, we have recently announced the PEO restructure, the program executive officer restructure. If you take a look at what we were trying to do in the early 1990s as a result of some rather sensational over-costs that occurred in things like the hammer and the toilet seat and coffee maker in the late 1970s/early 1980s, the Congress was very concerned about our acquisition corps and whether we had a group of people who could actually understand all of the details and activities associated with proper procurement strategies and contracting and engineering efforts. The Goldwater-Nichols Act, the blue ribbon Packard Commission, the Defense Acquisition Workforce Improvement Act, our 5,000 series regulations, our Air Force directives, all oriented towards developing a corps of people who could do a better job of designing, developing and acquiring and then sustaining our weapon systems.

At the same time that was happening, the US Air Force, as you may recall, inactivated the logistics command and systems command and created the Air Force Materiel Command. If you recall the cradle-to-grave that I showed you there, the science and technology, the development of fielding, sustainment, modernization and the depot maintenance activities, we told everyone

when we activated the Air Force Materiel Command that we had a single face to the customer and that we were going to do cradle-to-grave management. But, as we began to execute this in the early to mid 1990s, we began to see that actually there were two people out there that were talking to the customer—those who are in Air Force Materiel Command and those who were in the acquisition community. Those people who were in Air Force Materiel Command had rules and mission statements that said they were responsible for developing and acquiring systems, but frankly, it was really over on the program side within the AQ or the SAF acquisition chain that people were really making those decisions—and not always with insight toward what one another was doing. The Air Force Materiel Command had the infrastructure. It had the air space. It had the flight tests. It had the telemetry. It had the anechoic chambers. It had the wind tunnels. It had the engineers. It had the computer models. It had the infrastructure to support programs success, but they were not involved directly in the programs at the leadership level.

Now, when you take the PEO structure and you make the PEO and the Center Commander the same, you have the infrastructure and you have the program authority to work together and ultimately produce the product that we have been asked to produce. And you also have the engineering effort and the history and analysis that you need to be more credible in those assessments and in those recommendations for funding profiles. In the end, over a period of time, what we should see is two great groups of people serving our nation now working in an integrated fashion with the authority and the resources necessary to improve our overall acquisition process. Because, what we are about, really, when all is said and done, is what I consider to be our most critical mission in this business and that is successful program execution. We want it as fast as we can and we want to make sure we are credible in the way we do it. That is really the genesis and the background of it. I think it is a great opportunity and a rare opportunity for our Air Force to take a mid-course correction and move forward in a way that has the opportunity produce some great results.

Q: According to a recent article in Air Force magazine, the airborne laser system is scheduled to be fielded in the year 2009. How do you feel about that schedule?

General Martin: Frankly, that is not a program I have spent much time on yet. As you know, I am new to the business. The airborne laser system is really right now within the Ballistic Missile Defense Organization and we do provide a significant amount of infrastructure, but I have not gotten into that program yet. In terms of the question, how do I feel about it? How do I feel about the airborne laser? I love it. Get 'em, make it work, 2009? I don't know. I'd like it faster. I bet the warfighter wants it faster. But right now I don't know enough about where they are in their technology maturation and the funding profiles and how they have set that program up to know whether that is good or bad. It is later than what we originally planned, but not too late. We were originally looking at the 2007 time frame as I recall. That is not much of a slip considering the 1995 initiation of the program.

My real point is this is a technology that has the potential to change the entire characteristic of battlespace. It is something we should be on the leading edge of. It is something that we should care a lot about and do everything that if it is possible to be successful that it is successful.

Q: Our Air Force and particularly Air Force Materiel Command has demonstrated an ability to put great technology into the field quickly during our war-time periods. Do you see these processes from our war-time experience being extended into our peacetime processes?

General Martin: I'd sure like to. A little adrenalin, a sense of urgency, and the knowledge that there are people in harm's way can turn otherwise great professionals into extraordinary professionals. But, it comes at a cost. And we have to be careful about that because we want things as fast as we can get them, but we want them in such a way that they are sustainable and that they are able to be operated at the unit level. In some cases, we will field activities but we will have an elite group with them. We will not have TOs. We will not have the sustainment processes, but these people are so expert and so capable that they are able to carry the day. In the end, as you begin to proliferate those, we have found over the years that establishing the

appropriate training schedules, the appropriate TOs and the appropriate sustainment pipe lines becomes as important as the technology and the capability of the platform. What I'd like to see us do, though, is be able to be much more agile and much more rapid in that process. The ability to write TOs using stubby pencils versus automated tools that can help you with it might help us there. The ability to apply the tools that I just talked about when it comes to the appropriate development of demand levels for supply and sustainment activities, that can give us some insights. The work that the people are doing in the JSF on autonomies to do prediction of what the right requirements will be will allow us to not only develop systems faster, but field them in such a way that they are sustainable at the unit level by people who are new to that process. My view is that one of the areas that we have a great opportunity to harvest important fruit for our Air Force and for our nation is going to be in the speeding up of the sustainment and support functions associated with every one of our weapon systems. I will work that very hard.